The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte THOMAS BAYER

Appeal No. 2006-1165
Application No. 10/049,173
Technology Center 3600

ON BRIEF

Before OWENS, CRAWFORD and BAHR, *Administrative Patent Judges*.

BAHR, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal from the examiner's rejection of claims 8 and 9. Claims 1-7 have been canceled.

We AFFIRM.

BACKGROUND

The appellant's invention relates to a three-stage planetary transmission. A copy of the claims under appeal is set forth in the appendix to the appellant's brief.

The examiner relies upon the following as evidence of unpatentability:

Ridgely	US 2,591,967	Apr. 8, 1952
Shirokoshi	DE 19840968 A1	Mar. 11, 1999[1]

The following rejections are before us for review.

Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Ridgely.

Claim 8 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Shirokoshi.

Rather than reiterate in their entirety the conflicting viewpoints advanced by the examiner and the appellant regarding this appeal, we make reference to the examiner's answer (mailed September 8, 2005) for the examiner's complete reasoning in support of the rejections and to the appellant's brief (filed July 27, 2005) and reply brief (filed November 10, 2005) for the appellant's arguments thereagainst.

[1] We derive our understanding of this reference from US Pat. No. 6,099,432, issued August 8, 2000, which the examiner has identified as an equivalent without any challenge by the appellant.

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellant's specification and claims, to the applied prior art, to the appellant's declaration under 37 CFR § 1.132 filed March 2, 2005 (copy appended to the brief) and to the respective positions articulated by the appellant and the examiner. Having reviewed all of the evidence and argument before us, we conclude that the examiner's rejections should be sustained. Our reasons for this conclusion follow.

It is undisputed that each of Ridgely and Shirokoshi discloses a three-stage speed-reducing planetary transmission having, in each stage, a driven sun wheel (sun gears 21 of Ridgely; sun gears 14, 24, 45 of Shirokoshi) rolling in an internal gear (internal ring or gear 14 of Ridgely; internal gears 11, 21, 32 of Shirokoshi) and interacting with a planet wheel (planetary gears 16 of Ridgely; planet gears 13, 26, 41 of Shirokoshi) mounted on a planet carrier (carriers 19 of Ridgely; carriers 12, 25, 38, 39 of Shirokoshi), in which the sun wheels of the second and third stages are each driven by the planet carrier of the preceding stage, and a fixed transmission housing (housing 12 of Ridgely; casing 2 of Shirokoshi), as called for in claims 8 and 9. Additionally, there does not appear to be any dispute that the planet carriers of the second and third stages of Ridgely and Shirokoshi are each provided with four planet wheels in a circumferential direction (see Figures 2 and 3 of Ridgely and col. 4, l. 38 of Shirokoshi) and that the internal gear 32 of the third stage of Shirokoshi is rigidly connected with the transmission housing (casing 2) and the internal gears 11, 21 of the first and second stages are each rigidly

connected with the planet carrier 38, 39 of the third stage, as called for in claim 8, or that that the internal gear 14 of all three stages of Ridgely is rigidly connected with the transmission housing 12, as called for in claim 9. Moreover, the examiner and appellant are also in agreement that neither Ridgely nor Shirokoshi expressly discloses the particular number of teeth ($z = 108$)[2] and transmission ratios ($i = 4$ and $i = 5.5$) for the second and third stages, respectively, called for in claims 8 and 9.

The examiner's position in rejecting claims 8 and 9 is that the number of teeth on the internal gears and the transmission ratios of the second and third stages, which are themselves a function of the number of sun gear teeth, planetary gear teeth and internal ring gear teeth (see answer, p. 6), involve only routine skill in the art and would have been obvious to one of ordinary skill in the art (answer, pp. 4, 5 and 7). The appellant, on the other hand, argues that the particular combination of number of internal gear teeth, planet gears and second and third stage transmission ratios yields unexpected results and thus would not have been obvious to one of ordinary skill in the art.

It has consistently been held that discovery of an optimum value of a result effective variable is ordinarily within the skill of the art. *See In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) and *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). As stated in *In re Huang*, 100 F.3d 135, 139, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996):

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[2] Ridgely's Figure 2 appears to illustrate approximately 64 teeth on the internal ring.

> This court and its predecessors have long held, however, that even though applicant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within the capabilities of one skilled in the art, unless the claimed ranges "produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art."

Additionally, as stated in *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990):

> The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . These cases have consistently held that in such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range [citations omitted].

The main thrust of the appellant's declaration under 37 CFR § 1.132 and of the argument in appellant's brief is that the selection of a non-whole-number transmission ratio, as the appellant has done, was "[c]ompletely in contrast to the technical knowledge of a gear mechanism designer of ordinary skill in the art that is usually practiced" (declaration, p. 6). According to appellant's declaration (p. 6), the investigation of the use of a non-whole-number ratio of 5.5, for example, in a

gear stage having three or four planet gears, with a planetary gear mechanism having a total of three stages, made it possible to achieve unexpected results.

The examiner has proffered US Pat. No. 5,045,035 (issued September 3, 1991 to Ganoung) as evidence that the use of non-whole-number transmission ratios (e.g., 1.35) was known in the art at the time of the appellant's invention and the appellant has not challenged that the Ganoung patent establishes such. On the basis of our review of the Ganoung patent, the discussion of this patent by the examiner (answer, pp. 5-6) and the appellant's failure to challenge, by either argument or evidence, the examiner's assertion that the Ganoung patent establishes that non-whole number transmission ratios were known for use in planetary transmissions at the time of the appellant's invention, we find the examiner's citation of Ganoung to be an effective impeachment of the statement in appellant's declaration that non-whole-number transmission ratios were in complete contrast to the technical knowledge of a gear mechanism designer of ordinary skill in the art.

We also find, based on our review of the appellant's declaration, that one of ordinary skill in the planetary gear transmission art would have been able to readily determine from an analysis of Diagram 2, which the declaration identifies as being "part of the generally known state of the art" (p. 4), and the known formula for determining the total transmission ratio of two consecutive stages of a gear mechanism (declaration, p. 7) that, for an internal gear teeth number of 108, a transmission ratio of 5.5 is possible with three and four planet gears and, in combination with a transmission ratio of i = 4 in the front stage, yields a particularly

high whole-number transmission ratio of $i = 4 \times 5.5 = 22$. This result for using a transmission ratio of 4 in the second stage and a transmission ratio of 5.5 in the last stage therefore cannot be considered unexpected. One of ordinary skill in the planetary gear transmission art seeking to design a three-stage planetary gear transmission of the type disclosed by Ridgely or Shirokoshi, like the appellant, would have had as an objective optimal output torque and high transmission ratio (see, for example, col. 3, ll. 44-55 of Ridgely) and, in so optimizing, would have been led, for the same reasons as appellant, to the internal gear teeth number and transmission ratios selected by appellant and recited in claims 8 and 9. As for the statement in appellant's declaration (p. 9) that the increase in torque from 100%, using three planet gears, to 135%, using four planet gears, "was totally unexpected and was unpredictable," the declaration does not explain why such a result would not have been expected or predictable by one of ordinary skill in the art. In any event, a person of ordinary skill in the art, following the teachings of Ridgely or Shirokoshi of four planet gears, would most certainly have immediately contemplated the use of four, rather than three, planet gears and, in so doing, would have observed the same type of torque output observed by the appellant, whether or not such a person recognized the improved torque output relative to a three planet gear mechanism having the same transmission ratios in the second and third stages.

In light of the above, we find that the appellant has failed to establish that the claimed combination of internal gear teeth number, planet gear number and transmission ratios achieves unexpected results relative to the prior art or produces

a new and unexpected result which is different in kind and not merely in degree from the results of the prior art. We accordingly conclude that the differences between the invention recited in appellant's claims 8 and 9 and the applied prior art, Shirokoshi and Ridgely, are of such a nature that the combination of teeth number, planet gear number and transmission ratios recited in claims 8 and 9 would have been obvious to one of ordinary skill in the art to incorporate into the planetary gear transmissions of Shirokoshi and Ridgely in the course of routine optimization within the skill of the art.

CONCLUSION

To summarize, the decision of the examiner to reject claims 8 and 9 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a). *See* 37 CFR § 1.136(a)(1)(iv).

AFFIRMED

TERRY J. OWENS
Administrative Patent Judge

MURRIEL E. CRAWFORD
Administrative Patent Judge

JENNIFER D. BAHR
Administrative Patent Judge

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